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[Please stand by for real time captions.]

Okay hi everyone. Welcome to this Knauss Fellows 3 Minute thesis. Welcome to our listeners on the webinar. I'm just going to give a quick rundown of the roles. They are very, very simple. Each speaker will have three minutes to talk and they only have one slide to use as a reference. At the end of the speech we will have one minute to set up the next speaker in the next talk. At the end we will have two votes. One is for the best verbal presentation and the other is for best presentation slide. We will start off with Lauren Gibson, she will be going first, you will have three minutes. She will talk about Solenoid's survival.

75 million years ago the earth was a very different place. It was the time of the dinosaurs. Though it would still be a few million years before man came around. It was already an equally weird creature in existence. Unlike the dinosaur [indiscernible] still survives today. Pictured here he roughly resembles a bunny size version of [indiscernible] it is equally weird. It produces its own venom which it uses to paralyze pray like tarantulas, scorpions, giant millipedes and other equally terrifying insects. However despite their venom and their long history of survival for 75 million years it is now on the brink of extinction. Although site is generally blame climate change, habitat fragmentation and other issues on their decline no one really knows what factors shape this decline. Over the past five years I have dedicated myself to finding out about this. I did this through distribution models. These models link areas of occurrence with different environmental base layers. Things like human population density., Climate, temperature. [indiscernible] in the past as you can see on the left here before humans really took over the landscape they were distributed fairly evenly. Climate was the major determinant of their distribution. With wide swatches of suitable habitat. A transition between suitable and unsuitable habitats. Contrast that to their modern distribution. Human population density is really now the main driver for the distribution and decline. We can see some pretty stark differences between areas of their habitat. This is because humans generally exhaust the system wherever they move. Everywhere humans are dogs are. But, because humans are the reason for the endangerment we have a solution. I'm also working to inform local conservation on children [indiscernible] there is still hope for them. They can survive maybe for another 75 million years. [Applause]

Thank you, what up wonderful presentation. Next we have James Murphy who will be talking to us about [indiscernible]

Good afternoon. My name is James Murphy and I'm [indiscernible] part of my dissertation was examining enzyme activity and natural cycles of them in reef building coral. If you have been following news about [indiscernible] you've probably heard about a lot of higher instances for mortality occurring. A lot of that is due to the stress and climate change influences. Mortality is not a good indicator were coral is trying to get too stressed out. We have been trying to adapt and adopt mile markers for pre-Morton's dress evaluation. Enzymes are actually great mile markers for this. They respond to activity levels and pick up during levels of stress. However we have really does she recognize that there is a need not only to use these distress evaluations and coral but also understand what her baseline levels, what do they look like as coral shift? Based on previous activity, previous research coming from our lab I found that that resistant proteins are found to help regulate inactivity during lunar cycles. It was during a full moon on one corner and a new moon, with my experiment I designed experiment to include around a one quarter moon cycle. Over and Iona Bay. [indiscernible] they expressed significantly higher activity during three quarter moon cycles in this coral while one quarter moon cycles [indiscernible] this is really important as a visual aid in instructing our sampling regime for the future to make sure that we do not sample during these peak times. We need to keep these baseline activity times when we sample. We need to understand how these coral cycle in these plant levels cycle and expend the test analysis by increasing or molecular mile markers. I'm a little early but if you have any other questions I will be happy to answer them. [Applause]

Really great job James, thank you so much. Next we have Katie O Reilly. Talking about the Great Lakes.

Awesome, thank you Sarah for organizing this and thanks everyone for coming out. I actually want to give you guys a challenge. Take a moment to close your eyes and think of a beach. The first thing that comes to your mind, what does it look like? I can tell you for me the beach that comes to my mind has rolling waves of pea soup green water and is covered with mussel shells sharp enough to cut open your feet. As a kid who grew up on the western shore of Lake Erie this was my first impression of a beach. With nearly 40 million people living and relying on the Great Lakes for drinking water, recreation and transportation it is probably not surprising that this is a place where conflicts often arise between humans and their environment. That beach experience I told you about was the result of some of those conflicts. The PC -- pea soup green water was a result of algae from runoff from the surrounding agricultural land. The shells the cut open my feet were actually from an initiate -- invasive species that came over from Asia. The Great Lakes really provide this ideal place for ecologist to study how humans are dramatically changing the environment around them. More often than not these issues intersect and kind of come to a head in where the land meets the lake. Basically coastal areas such as coastal wetlands. To give you some background coastal wetlands and the Great Lakes are kind of the understated ecological parts. They provide critical habitats replan edible species. They also improve water quality by acting like sponges to soak up some of the runoff from the surrounding land. Despite their importance and nearly half of all wetland areas have been lost in the wetlands that we do have left are threatened by a variety of factors. My ongoing dissertation

research is kind of better understanding the function of these ecological wetlands and how those functions may change over time due to human impact. Particularly I'm interested in how this user coastal wetlands through their lives. That is trying to answer when are they using the wetlands, which wetlands are they using and why? But, because fish are notoriously difficult to interview wheeze a couple different techniques. The one on particular focusing on is a technique called [indiscernible] they are fish your bones that form like tree rings. They also incorporate the chemistry around them and we can use that chemistry to reconstruct their life history. While the great looks basically -- face great challenges we will need innovative and great solutions. Thank you. [Applause]

Great job Katie. Next we have Sammi. He will be talking about water quality depended industry.

Good afternoon everyone and thanks for this event being organized. I will be presenting the research I conducted for the University of Miami. It was identified as a no habitat. This was for fisheries, recreation and other tourism activities. However water quality in the bay has been [indiscernible] the purpose of my study was to find out about water studies about commercial, recreational and higher fisheries follows seafood wholesalers and businesses that depend on a healthy baby. The specific objective of this research was to conduct socio-economic polls. To describe stakeholder adaptation strategy in the face of changing water quality. My team and I used online surveys and in-person interviews to reach our stakeholders and on the right you can see three examples of the output for recreational fisheries as well is a table describing influences of industry on the water quality. We determined fishing effort was concentrated in the southern half of Biscayne national Park. He takes things a step further we asked visitors to identify the Fisher regions reducing the map on the top right. This map tells us Fisher's preferred to finish further offshore. We were asked to identify specific areas with the greatest wallet quality -- water quality concern. Water quality degradation or more kinds of -- concentrated in these areas and the fishing areas. I'm interested in determining the stakeholder sector and tenure could be used to describe differences. Tenure refers to a length of time that the stakeholder is been working. All groups observed that water quality was declining. Stakeholders were also asked about the types of degradation they observed. Views on the types of changes and that types of degradation varied by sector but not by tenure. Finally respondents were asked how they would adapt to water quality in their preferred areas and declined to a point where they could no longer operate. An adaptation strategy began. This study presents a wide range of socioeconomic, resource use and perception based data for Biscayne water-based industry. It can be used in further analysis. That's it. [Applause]

Really excellent job. Next we have Grace. She will be talking about her thesis work on [indiscernible]

Climate change is a global threat. It is advancing most rapidly in the Arctic. In some areas of the Arctic the ice melt is a month longer than it was 30 years ago. Climate change threatens the ecosystem. It may result in the [indiscernible] research managers are test with responding to these threats using the best available science but when that science is limited by harsh

conditions and the Arctic species. Finding the best management solutions is difficult. The challenge can be met using a climate change vulnerability assessment. From a master's thesis I apply this framework to assess the vulnerability of eight species of mammals. What I want to focus on today is the method itself and how it can be right widely adopted. This climate change vulnerability was developed by the IPCC. It combines exposure to a climate change with sensitivity which is characterized as a response to the changes. To determine the potential impact of climate change. This is unmitigated by the species adaptive capacity or their ability to withstand change. These components can each be quantified by breaking them down as indicators. For example exposure indicators depend on snowpack. This criteria can then be developed on the resolution of the data. The more data and less uncertainty that exist the more complex it can be. The scores for each indicator can be added together either quantitatively or qualitatively to get the final scores for each component. Because of the extremely limited data for the species I assessed I scored the data on a three-point scale. I combined them with the quality. I saw this approach best incorporated the uncertainty of the data. So then you just have to follow the framework to get your vulnerability. Key structure come next. By breaking these components down into individual indicators, weak points that could be benefit from the solutions are exposed. This process is meant to be [indiscernible] as conditions change and more data becomes available. For anyone curious these are the results for the data I gathered. In continuing this research I hope to use the result of this assessment is the exposure exponent for community development. To learn more you can join me at my brownbag next week. Thank you. [Applause]

Wonderful Grace thank you for sharing that with us. She will have a brownbag next week exciting. Next we have Noelle who will be talking about Jonah crab.

Just curious how many of you people have heard about Jonah crab. Not that many. The too many people questions people ask me is where do they live and do we eat them. Jonah crab can be found off the eastern coast from the Finland down to the Caribbean. People in New England eat them. They can grow up to 5 to 6 inches wide and look like a smaller version of a Dungeness crab but they have large current larger claw like a stone crab. The crash of the New England lobster has catalyzed [indiscernible] in June 2016 the Atlantic fisheries commission plan for Jonah Krebs. But until very recently there has been very little research done. In the past 25 years the orange bars on the graft in the yellow lines have increased fivefold. So for my Masters research I estimated [indiscernible] the sizes sexual maturity is a useful metric for management. Essentially you want to have your species of interest adjust to make. My results actually suggest that both male and female Jonah crab reach sexual maturity well below the legal age. [indiscernible] before the fishery continues to grow which I expect will happen. Jonah Krebs can be considered as a single resource there should be research on marketing to promote this research -- this resource. Jonah crab could relieve pressure on other crustacean fisheries. It could also provide an alternate slivers of crabmeat which could help decrease dependency on imported species [indiscernible] also that Jonah crab fisheries could help retain jobs for fishermen. I have eaten many Jonah crabs throughout my time and I recommend that you try them if you see them on the menu. [Applause]

Wonderful thank you so much Noellel. Next we have Bridget and she will be talking to us about [indiscernible]

Okay, good afternoon. When I picture the coast I picture something a little more idyllic. I'm sure many of the people in this room [indiscernible] it shapes the reason we are here with Noah. We are not alone. 40% of the population live on the coast of the Great Lakes or the ocean. This makes a really strong economic fabric. It contributes more than \$80 million. These images of Myrtle Beach South Carolina show that the migration really results in changes to our land usage. We see the transformation from green to hardened great infrastructure over time. That change comes with a real cost. Research demonstrates that the negative impact begin to incur once hardened services cover about 20% of the neighboring land area. How do we balance the need, the needed environmental protection with a desire for so many people to live on the coast in the development that comes with it. Fortunately Congress recognize the challenges facing our close. [indiscernible] it established a voluntary relationship between our coastal territories in our federal government. Today there are 34 coastal programs working throughout the country to ensure that the best available climate and policy tools are available. They will also allow sustainable economic viability for the local community. Nonprofit coastal states organization often creates a national capacity of these estate programs. They provide a national platform for learning and they also partner with other nonprofits and federal agencies to make sure that they share resources. These include water quality and land usage. This initiative partnering with the federal agencies led to my position with the environmental protection agency and EPA brings to the table helping states gauge water impact. [indiscernible] when we connected resources with Maryland and helping local communities address the impact on climate change in the water resources. Going into the future and working together with programs on the ground is the best way to ensure that that beautiful idyllic image is sustained far into the future. [Applause]

Thank you Bridget for that very informative talk. Next we have Emily. She will be talking to us about groundfish.

Thank you Sarah. It's nice that use chose to spend it indoors listening to me. As you might imagine [indiscernible] they sometimes have to find a new place to live that have favorable conditions. Black sea bass or migratory groundfish. These fish live in shallow, brackish estuaries. In summer and overwinter they left in warmer water. In the Northeast we are very lucky to have fisheries independent surveys throughout the area. It counts fish using a randomized survey. The survey works as a [indiscernible] interestingly the survey has captured more these fish in recent years and though the ship's effort throughout the area has not changed. It could mean that the fish to the survey has changed and possibly two ways. One either there are more fish in the population has actually increased or since these fish or migratory the timing of the fish entering the survey or as the survey happening has possibly changed. That may be relative to climate change. Not only that but I figured the differences between young fish and old fish as well as different seasons. The smaller fish need different things than adult organisms do. [indiscernible] there are a few ways of finding out like the black

sea bass [indiscernible] I used to different analysis to find and define what stable habitats work for these fish. First I use a cumulative function to find the preferences of these fish and then I used a generalized additive model to try to quantify the suitable habitat along the coast. I input variables like tempter, quantity, bottom tied an ocean [indiscernible] both analysis came back with some very similar conclusions. Both species experienced significant distributional shifts. For summer flounder the temperature was really important.. Black sea bass temperature was really important. It could mean that we should consider having some adjustments to the availability of the service. This way we could better understand how many fish are actually there. Thank you. [Applause]

Thank you Emily really great job.

Our next speaker is Sarah. I will be talking about optimal technology and data storage and making them accessible to machine learning. Optical technologies are incredibly important. They allow us non-aquatic creatures to peer into the marine environment as the world that lives below us. Us as scientists and conservationists think it's really important and we value the lives that live in the ocean. What was in the ocean are also very incredibly important resources for the United States and they add job security and food and items to the economy and they are really important to look at. NOAA fisheries use optical technologies to provide information about these resources. We conduct the surveys and we do habitat assessment. When we collect this data we have a ton of information. We have millions of files, we have thousands of hours of video and where does all this information go customer where can we find it? Who in the world has the time to look through all of it? Let me answer those questions. Currently video and images collected by NOAA fisheries is mostly stored at the scientist tests and hard drives. This presents an issue because all of NOAA's data must be available to the public. There needs to be an effort to centralize the storage and make it accessible mostly by a user portal or something that users can access online. A key to story and finding this data is standard dazed metadata. Metadata is information about the data whether it's location ID or what you are actually seen in the video. Also has the time to look at all this data. The answer is nobody has the time but we do. We spent time and we spend money and we look through all the data and we annotated to try to find information. Luckily machine learning has entered the world of environmental processing. Machine learning is basically computer algorithms that do not have to be explicitly programmed by people and can train on their own. NOAA fisheries have made Evers towards creating computer software that will go through and analyze this video and in the future hopefully we will be able to identify fish species, and all the information that we use for our critical self-assessment. This year which is [indiscernible] they will be trained on how to use this program. In order to use the machine learning to increase efforts of human time and processing. Any to be stored and made useful to other sciences. Thank you very much. [Applause]

Okay great job Sarah. Really informative information. As you may have noticed we have two people that were not here today. So now we are actually going to do some voting. There are a lot of people here and I will just hand out [indiscernible] we finished early so we have some

time. For the viewers at home we have a webinar poll. To remind everyone we have two audience voted awards. We have one for best oral presentation and we have one for best slide. This is called your slide drive. Maybe I just might scroll through one last time the slide so you have everyone's in mind. If that is helpful as a reminder. I will not ask everyone to re-give their presentation so hopefully you remember it. Keep this in mind, the first one was Brian. Then James Murphy. Katie O'Neill, Sarah, Sammy, faith, Noah, Bridget, Emily, and Sarah. We will not be shy we will do this in front of everyone. We will do best slide first. So online the voting will start. Everyone did a really great job by the way. So Brian has eight. James Murphy on coral. We are doing the slides first. All right James Murphy. Katie O'Reilly. Five. Six, okay. Sammy. Grace Ferrara, too. All right should I start with the next one or we just did grace. Next one is Noah. Bridget. Emily. I know how much time she put into that so. And then Sarah. So now hopefully everyone remember the actual presentations and we will go through one more time. Starting with Lauren. I appreciate all your feedback. James Murphy. I can really great job. Katie O'Reilly. Sammy. Grace Ferrara. Noel. Bridget. Emily Markowitz. Sarah Margolis. Okay. Hang tight for a moment while I get these results over here. [Laughter] [Indiscernible - multiple speakers] okay all right everyone. Quiet, order, order, order. We did a really wonderful job. I really enjoyed hearing about the research and some of the work you are doing. We have two winners one for the slide. That was Lauren Gibson. Then for the slide oh I'm sorry, for the slide it was Noelle. We have cookies for everyone and cupcakes and watermelon over here. Thank you everyone for showing up. What a great afternoon. [Applause]

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